~~SECRET~~

The Files - Contract 607, Task Order 1 28 November 1958

25X1A9a [redacted]

Trip Report - Thermoelectric Generator, BC-7

1. On 25 November 1958 a visit was made to the [redacted] 25X1A5a1
25X1A5a1 [redacted] to monitor progress on Contract 607, Task Order 1, development of the thermoelectric generator, BC-7. Persons participating in the discussions were:

25X1A5a1 [redacted]

25X1A9a [redacted] - OC-E/R&D-KP

2. The contractor has met with several difficulties in the development of the BC-7. High contact resistance on the thermoelements, thermal losses, and low efficiency in the DC-to-DC converter have caused the output of the generator to be negligible. However, the contractor has been successful in overcoming the high contact resistance and has found a means to reduce the thermal losses.

3. Formally, the contractor used zinc-antimonide and constantan in the individual couples of the generator. Because of the difficulty in bonding constantan to zinc-antimonide, the contact resistance was 50 to 60 percent of the total resistance of the individual couples. This problem was overcome by replacing the constantan with silver, thus lowering the Seebeck coefficient, but also reducing the contact resistance to below 15 percent of the total resistance of the individual couples.

4. The zinc-antimonide and silver thermocouples have a Seebeck coefficient of 170 microvolts per degree centigrade. The contractor has connected 72 couples in series in the BC-7 thereby giving 12.24 millivolts per degree centigrade for the entire generator. Specifications hold the contractor to a delta temperature of 220°C, and with this delta temperature, the maximum output from the 72 thermoelements was 7.25 watts. However, after assembly of the couples into a "frying pan", the output was reduced to 1.6 watts before the pan was connected to the DC-to-DC converter which dissipates approximately 1.6 watts. A large amount of these losses is caused by poor thermal conductivity from the bottom of the pan to the thermocouples. Obviously, the thermoelements must be electrically insulated from the pan with a minimum of thermal insulation. This insulation must withstand temperatures of about 400°C so mica was used on the hot junction and anodized

~~SECRET~~

aluminum was used on the cold side. However, mica, while being a good electrical insulator is also a good thermal insulator and for this reason there was a considerable loss of power. This problem will be corrected by "hard coating" the pan better thus giving good electrical insulation and poor thermal insulation.

5. The contractor feels the problems in the SC-7 have been corrected; however, an extension of time is required to make these changes. A 90 day extension will be requested and the new contract completion date will be 28 February 1959.

[redacted]

25X1A9a

OC-E/R&D-EP/CWS:wlj (28 November 1958)
cc: R&D Subject File
Monthly Report (2)
R&D Lab
OC-T
R&D Chrono
EP Chrono